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This longitudinal study examined the relation between continuity and change in the Big Five personality traits and life events. Approximately 2,000 German students were tracked from high school to university or to vocational training or work, with 3 assessments over 4 years. Life events were reported retrospectively at the 2nd and 3rd assessment. Latent curve analyses were used to assess change in personality traits, revealing 3 main findings. First, mean-level changes in the Big Five factors over the 4 years were in line with the maturity principle, indicating increasing psychological maturity from adolescence to young adulthood. Second, personality development was characterized by substantive individual differences relating to the life path followed; participants on a more vocationally oriented path showed higher increases in conscientiousness and lower increases in agreeableness than their peers at university. Third, initial level and change in the Big Five factors (especially Neuroticism and Extraversion) were linked to the occurrence of aggregated as well as single positive and negative life events. The analyses suggest that individual differences in personality development are associated with life transitions and individual life experiences.

Keywords: personality development, five-factor model, life events, stability, young adulthood

Over the last 2 decades, research has brought greater clarity to the basic patterns of consistency and mean-level change in personality traits. Personality traits are moderately consistent over relatively long periods (e.g., 5 years) and are increasingly consistent with age (Roberts & DelVecchio, 2000). Moreover, personality traits show a clear pattern of mean-level changes, especially in young adulthood (Roberts, Walton, & Viechtbauer, 2006). Disproportionately less attention has been paid to a third dimension of personality development: individual differences in change (Roberts & Mroczek, 2008). Individual differences in change represent patterns of development that, like personality itself, are unique to individuals or subsets of individuals. Research focusing on individual differences is important because it addresses both why personality changes (personality data can be linked directly to data on life experiences and environmental influences) and why mean-level changes in populations come about (Neyer & Asendorpf, 2001; Roberts & Mroczek, 2008; Vaidya, Gray, Haig, & Watson, 2002).

Unfortunately, few studies have tracked individual differences in change in personality traits at the transition from adolescence to young adulthood while simultaneously assessing life experiences and the different life paths that individuals follow. In this article, we address this lack of empirical research by using the Transformation of the Secondary School System and Academic Careers (TOSCA) study (Köller, Watermann, Trautwein, & Lüdtke, 2004), which has tracked the personality development and life experiences of several thousand German teenagers into the initial stages of young adulthood. The TOSCA study is ideal for these purposes, not only because of the relevant information that has been assessed, but because personality and life experiences have been assessed over multiple occasions, making it possible to measure development in personality and the experiences of life events more reliably and accurately.

Personality Trait Change in Transition From Adolescence to Young Adulthood

Recent research has shown that the most robust changes in personality traits take place in young adulthood and especially at the transition from adolescence to young adulthood. A meta-analysis of 92 longitudinal studies (Roberts et al., 2006) showed that the largest changes in personality traits occurred between ages 18 and 30. Specifically, young adults became more socially dominant (a facet of extraversion), more conscientious, and less neurotic. Although the meta-analytic findings concerning agreeableness were ambiguous, several cross-sectional studies have shown that older people score higher on agreeableness as well as consci-

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entiousness, and lower on neuroticism (Labouvie-Vief, Diehl, Tarnowski, & Shen, 2000; Srivastava, John, Gosling, & Potter, 2003). A series of more recent longitudinal studies has both replicated and refined the picture drawn from the meta-analytic and cross-sectional findings. Lönnqvist, Mäkinen, Paunonen, Henriksson, and Verkasalo (2008) found that a sample of Finnish military conscripts increased in agreeableness and conscientiousness and decreased in neuroticism from ages 20 to 35. A sample of Germans taking part in a study on relationships showed similar changes from ages 24 to 32 (Neyer & Lehnart, 2007; see also Neyer & Asendorpf, 2001). Two studies focusing more closely on the transition from adolescence to young adulthood (ages 17–24) found essentially the same pattern. A sample of college students followed for 7 years showed increases in agreeableness and conscientiousness, as well as decreases in neuroticism (Vaidya, Gray, Haig, Mroczek, & Watson, 2008). Similarly, a sample drawn from rural Iowa showed increases in measures of constraint and impulse control and decreases in measures of stress reactivity and aggression, which reflects a blend of low agreeableness and high neuroticism (Donnellan, Conger, & Burzette, 2007). Clearly, these studies establish the transition to young adulthood and the period of young adulthood as a critical period of personality trait development. Moreover, the changes that occur are predominantly positive, as the consequences of higher agreeableness, conscientiousness, and emotional stability include such desirable correlates as more positive relationships, greater success at work, and better health outcomes (Roberts, Kuncel, Shiner, Caspi, & Goldberg, 2007).

However, it has also been argued that a complete understanding of personality development is possible only if individual differences in personality trait change are examined (Nesselroade, 1991; Roberts & Mroczeck, 2008). The concept of individual differences in change is grounded in work on life-span developmental theory (Baltes, Lindenberger, & Staudinger, 2006; Baltes & Nesselroade, 1973) and refers to the phenomenon that some people fail to conform to the general trends by not changing at all, being more accelerated in their change patterns with time, or changing in ways that contradict normative trends. In the last 2 decades, several studies using the Reliable Change Index (Roberts, Caspi, & Moffitt, 2003) or growth modeling (Raudenbush & Bryk, 2002) have confirmed the existence of reliable individual differences in rates of personality change, which replicate across different age groups (e.g., Allemand, Zimprich, & Hertzog, 2007; Helson, Jones, & Kwan, 2002; Helson & Srivastava, 2001; Jones, Livson, & Peskin, 2003; Jones & Meredith, 1996; Mroczek & Spiro, 2003; Small, Hertzog, Hultsch, & Dixon, 2003; Terracciano, McCrae, Brant, & Costa, 2005; see Mroczek, Almeida, Spiro, & Pafford, 2006, for an overview). Of particular relevance for the present study, many studies with young adult samples have documented sizable individual deviations from the patterns of mean-level change, with some individuals increasing and others decreasing on specific personality traits across time (Donnellan et al., 2007; Lüdtke, Trautwein, & Husemann, 2009; Robins, Fraley, Roberts, & Trzesniewski, 2001; Vaidya et al., 2008). Although the existence of reliable individual and mean-level differences in personality trait change has been established, relatively little is known about why these changes occur during this specific period.

Why Do Personality Traits Change During the Transition to Adulthood?

The primary theoretical explanation for personality traits changing as they do at the transition from adolescence to young adulthood is the neosocioanalytic model of personality trait development (Roberts, Wood, & Caspi, 2008). The neosocioanalytic model identifies several mechanisms that may contribute to personality trait change. The primary mechanisms identified at the transition to adulthood are the experiences that come with age-graded social roles (Lodi-Smith & Roberts, 2007; Roberts, Wood, & Smith, 2005). Age-graded roles found in work, family, and community come with their own set of expectations and contingencies that promote a reward-and-punishment structure that prompts people to become more agreeable and conscientious and less neurotic (Wood & Roberts, 2006). Several longitudinal studies have demonstrated that experiences in work are correlated with changes in personality traits and that the patterns are consistent with the neosocioanalytic model. For example, experiences such as working more than others or attaining higher status are associated with increases in traits from the domain of conscientiousness (Clausen & Gilens, 1990; Elder, 1969; Roberts, 1997; Roberts et al., 2003). Positive experiences in work are associated with increases in traits tied to the domain of emotional stability (Roberts & Chapman, 2000; Scollon & Diener, 2006; van Aken, Denissen, Branje, Dubas, & Goossens, 2006). Experiences in social relationships have also been shown to be associated with changes in personality traits. For example, engaging in a serious partnership for the first time in young adulthood is associated with decreases in neuroticism and increases in conscientiousness (Lehnart, Neyer, & Eccles, 2010; Neyer & Asendorpf, 2001; Neyer & Lehnart, 2007; but see also Asendorpf & Wilpers, 1998), and receiving more support from family members during adolescence is associated with increases in agreeableness (Asendorpf & van Aken, 2003; Branje, van Lieshout, & van Aken, 2004).

Although it is clear that experiences within social roles are related to individual differences in personality trait change, it is also clear that these types of experiences fail to explain all personality change in young adulthood. An alternative way to understand personality trait change is to investigate a broad range of nonnormative life events and experiences, many of which fall outside the range of typical social role experiences. Based on life-span developmental theory (Baltes et al., 2006; see also Thomae, 1979), recent research on personality development has emphasized the potential importance of nonnormative individual life experience events and has demonstrated that these events can alter the trajectory of personality development (e.g., Costa, Herbst, McCrae, & Siegler, 2000; Löckenhoff, Terracciano, Patriciu, Eaton, & Costa, 2009; Mroczek & Spiro, 2003).

The TOSCA longitudinal study affords two opportunities to examine the intersection of normative and nonnormative life events and personality change. The present sample consists of students making the transition from secondary education to university or to vocational training or work. We see the decision to take one of these options as one that differentiates two distinct life paths. A life path is an environmental variable that is somewhat analogous to a personality trait, in that it represents the aggregation of experience over time. In the current sample, two primary life paths are represented in the form of going to university or entering

vocational training or work. Individuals taking the latter path are actively working and making the transition to their career. Individuals taking the former path, in contrast, are exploring career possibilities and gathering further skills and abilities before making a concrete commitment to a particular career path. Life paths also represent a larger coalescence of developmental processes, subsumed within identity development (Helson, Stewart, & Ostrove, 1995). For example, these paths will most likely represent "provisional identities" (Roberts, O'Donnell, & Robins, 2004) in which people begin to imagine and conceptualize what type of adult they will become. Moreover, adopting one path or the other may reflect a choice or may reflect a necessity forced on the student (e.g., to get into the labor market quickly). Thus, the path may or may not fit with the student's goals or provisional identity, and therefore the discrepancy would have to be negotiated (King & Smith, 2004). As all these identity developmental factors have been linked to unique patterns of personality development, we expect that people adopting one or more of these paths will exhibit distinct patterns of personality trait change over time.

In addition to these two life paths, we assessed life events (Sarason, Johnson, & Siegel, 1978) at two points in the longitudinal study. These life events were originally construed as random—a position that has long been abandoned given that putatively random life events are both heritable and partially explained by personality traits (Plomin, Lichtenstein, Pedersen, McClearn, & Nesselroade, 1990). Clearly, life events are often caused by individual differences in personality, an effect described as "selection" effects (Roberts & Wood, 2006), to the extent that people experience certain events either because they select themselves into those situations or because they are selected by others for those experiences (Headey & Wearing, 1989).

The types of life events surveyed in TOSCA provide a unique opportunity to test whether the experience of specific events also contributes to personality development through potential socialization effects (Roberts et al., 2008). Unlike life paths, the life events surveyed are thought to be inherently associated with elevated stress (negative or positive). For example, we considered events that are typically experienced negatively, such as the death of a family member, the end of a relationship, or failing a test, as well as events that are typically experienced positively, such as entering a new relationship or job, getting promoted, winning an award, or getting a promotion. By aggregating these events across the 4 years of the longitudinal study, we have the ability to see what type of events may be most relevant to personality trait change during this period of the life course.

One previous study has examined the relation between life events and personality development in young adulthood. In a longitudinal study of college students, Vaidya et al. (2002) showed that positive events were more likely to occur if a student was more extraverted, agreeable, and conscientious. In contrast, negative events tended to occur more often for individuals high in neuroticism and low in both agreeableness and conscientiousness (see also Magnus, Diener, Fujita, & Pavot, 1993). More importantly, positive events were associated with increases in extraversion, whereas negative events were associated with increases in neuroticism. The Vaidya et al. study highlights the importance of considering selection and socialization effects simultaneously. Personality traits both predict (selection effects) and respond to (socialization effects) life

experiences. It also highlights the potential weakness of a prototypical two-wave longitudinal design, in that the results for change in personality were modest and limited to extraversion and neuroticism, which may be attributable to the unreliability inherent in assessing change over just two waves of assessment (Mroczek et al., 2006; Raudenbush & Bryk, 2002).

Present Study

Approximately 2,000 German students were tracked over 4 years from high school to university or to vocational training or work. Personality traits were assessed three times: at the beginning of the study, 2 years later, and then another 2 years later. Retrospective life events were tracked at the second and third assessment. Features of the study design permitted the use of optimal analytical techniques for assessing change in personality and relating this change to both life paths and life events. Specifically, we employed latent curve analysis to track individual differences in personality trait change over the three waves (Bollen & Curran, 2006). This approach helps to minimize the effect of error on the estimate of change: The personality measures are modeled as latent variables, which are free of measurement error. Also, by assessing life events twice, we were able to aggregate events over the 4-year period to arrive at a more reliable estimate of the types of events that participants experienced.

On the basis of previous research and the observation that the most robust change in personality traits takes place in young adulthood, and especially at the transition from adolescence to young adulthood, we tested the following hypotheses (Roberts & Mroczek, 2008; Vaidya et al., 2008). First, the experience of life events over the 4 years of the study should be predicted by standing on personality traits at Time 1 (T1). Specifically, people who are more extraverted, agreeable, and conscientious should experience more positive events, whereas people who are more neurotic and less agreeable and conscientious should experience more negative events. Second, in line with the results reported by Vaidya et al. (2002), we hypothesized that experiencing more positive events would be associated with increases in extraversion, whereas experiencing negative events would be associated with increases in neuroticism. In addition to these basic hypotheses, we tested the relations between changes in personality and the individual life events themselves, to better understand which events are associated with change for individuals in this particular transition period.

Method

Participants

The data come from a large, ongoing German study (TOSCA) conducted at the Max Planck Institute for Human Development, Berlin (see Köller et al., 2004). The TOSCA project addresses both educational and psychological research questions. From the educational perspective, TOSCA examines the opportunity structure open to students from different backgrounds, the educational standards attained in German upper secondary schools, and the comparability of the school-leaving qualifications awarded across Germany. From the psychological per-

spective, a strong focus of the TOSCA study is on self-selection and socialization processes during the transition from school to work or university.

The data considered here were obtained from students in 149 randomly selected upper secondary schools in a single German state. The schools are representative of the traditional and vocational Gymnasium school types attended by the college-bound student population. Schools and students were randomly selected to ensure that the data were representative. The participation rate at the school level was 99%, and a satisfactory participation rate of more than 80% was achieved at student level. At T1, the students were in their final year of upper secondary schooling; their mean age was 19.51 years ($SD = 0.77$). Two trained research assistants administered materials in each school between February and May 2002. Students participated voluntarily, without any financial incentive. At T1, all students were asked to provide written consent to be contacted again later for a second wave of data collection. More than 60% consented to be recontacted for follow-up studies. At Time 2 (T2), 2 years after graduation from high school (February to May 2004), participants completed an extensive questionnaire taking about 2 hr in exchange for a financial reward of €10 (about $12). The third wave (Time 3 [T3]) took place from February to May 2006. Again, participants completed an extensive questionnaire taking about 2 hr in exchange for a financial reward of €10.

The Big Five personality measure was completed by 4,544 students at T1 (96% of the original sample; 55.3% female), by 2,307 students at T2 (48.7% of the original sample; 62% female), and by 1,908 students at T3 (40.3% of the original sample; 62% female). To test for attrition effects, we compared continuers, who participated at all three time points, with dropouts, who participated only in the first wave. Continuers had lower grade point averages[1] ($M = 2.51$ vs. $M = 2.30$; $d = 0.33$) and were more likely to be female, $\chi^2(1, N = 4531) = 105.5, p < .001$. With respect to the Big Five, continuers had higher Conscientiousness ($d = 0.15$) and Agreeableness scores ($d = 0.13$) than dropouts, but were almost identical in terms of Neuroticism ($d = 0.06$), Extraversion ($d = 0.01$), and Openness ($d = 0.05$). Taken together, although dropouts and continuers differed significantly in some domains, the magnitude of these differences was rather small and indicative of moderate selectivity effects.

Because the focus of the present study is on the relation between initial level and change in personality traits and the occurrence of life events, we based our analyses on all the available responses, even of those students who only completed the Big Five measure at T1. This procedure is supported by recent methodological research on missing data (Schafer & Graham, 2002), which suggests that powerful algorithms for dealing with missing values, such as the expectation–maximization algorithm and multiple imputation procedures, produce accurate parameter estimates if data are missing at random. Even if data are not missing at random, using these procedures typically results in less biased estimation than ad hoc procedures such as listwise deletion. In the present study, we used the full-information maximum likelihood estimator implemented in Mplus (Muthén & Muthén, 1998–2006) to deal with missing values. The full-information maximum likelihood estimator in Mplus applies a model-based approach to missing data (see Allison, 2001). Rather than missing values being imputed, model parameters are estimated using all the available information, also for those participants who have missing observations on some of the variables.[2]

Measures

Big Five dimensions. We measured the Big Five personality dimensions of Neuroticism, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness using the German version (Borkenau & Ostendorf, 1993) of the NEO Five-Factor Inventory (Costa & McCrae, 1992). Extensive work on the German translation has demonstrated the instrument's high reliability, validity, and comparability with the English original (e.g., Borkenau & Ostendorf, 1993). In our study, items were rated on a 4-point scale (1 = *strongly disagree*, 4 = *strongly agree*). In-depth psychometric analyses of the 4-point response format show that this format has some advantages over a 5-point scale (Lüdtke, Trautwein, Nagy, & Köller, 2004). Coefficient alpha reliabilities at the three points of measurement were .83, .87, and .88 for Neuroticism; .77, .80, and .79 for Extraversion; .73, .74, and .74 for Openness to Experience; .73, .73, and .75 for Agreeableness; and .83, .84, and .84 for Conscientiousness.

Life events. A survey was constructed to measure significant life events that our participants might have experienced after graduating from high school. The same set of life events was rated at T2 for the period between the first and second assessments and at T3 for the period between the second and third assessments. The list of life events was based on existing questionnaires such as the Life Experiences Survey (Sarason et al., 1978; see also Vaidya et al., 2002). We selected those items from these questionnaires that would be most relevant to the population investigated in our study. The final survey comprised 34 items (e.g., "entered a new relationship (lasting at least one month)," "illness or injury of a family member"; see Table 4). Participants were first asked to indicate whether they had experienced each event during the last 2 years. If so, they were asked to rate the impact of the event on a 5-point scale (1 = *high negative*, 2 = *negative*, 3 = *irrelevant*, 4 = *positive*, 5 = *high positive*). Participants were also given the opportunity to identify and rate up to three other important life events that were not included in the original list.

Two scores were calculated from these responses to the life events (see Vaidya et al., 2002). We determined the number of life events rated as 4 or 5 ("positive life events") and the number of life events rated as 1 or 2 ("negative life events"). Life events rated as 3 ("irrelevant") were considered neutral and were not included in further analyses. Furthermore, the numbers of

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[1] In the German education system, lower grade point averages indicate higher achievement.

[2] Although we argue for the superiority of the full-information maximum likelihood approach, we also analyzed the data using listwise deletion, including only those participants who completed the Big Five measure at all three waves of data collection. The pattern of results remained stable across both approaches to missing data. However, in a few cases, the estimated coefficients were no longer statistically significant due to the loss of power resulting from the reduced sample size.

positive and negative life events experienced by the participants were aggregated across the 4 years of the longitudinal study.[3]

Analysis Strategy

Interindividual differences in intraindividual change in the five personality factors were analyzed by means of multivariate latent curve models (see Bollen & Curran, 2006, for details) with multiple indicators, via structural equation modeling techniques. Researchers seeking to assess interindividual differences in intraindividual change must bear in mind that unreliability of the measured variables can distort estimates of growth parameters. We therefore used multiple indicator latent curve models to control for measurement error at the indicator level when assessing intraindividual change in personality traits (also called second-order latent growth models; Sayer & Cumsille, 2001). These models analyze change at the latent level, rather than at the observed level, and offer the advantage of distinguishing structural relationships from measurement error (Bollen & Curran, 2006). Figure 1 illustrates a univariate multiple indicator latent curve model for assessing individual change in Neuroticism. At the indicator level, occasion-specific measurement models were specified, linking the observed indicators to the underlying time-specific constructs. Four item parcels were used to measure each latent personality dimension (Little, Cunningham, Shahar, & Widaman, 2002; see also Allemand et al., 2007, for a recent application of parceling to assessing longitudinal change in the NEO Five-Factor Inventory). Compared with directly factoring the NEO Five-Factor Inventory items, using

Figure 1. Generic multiple indicator latent growth model with four indicators (parcels) of the latent variable Neuroticism (N), measured at three time points (T1, T2, and T3). The occasion-specific measurement models for N were constrained to be invariant across time, as indicated by factor loadings (a1, a2, and a3) that were set to be equal for each measurement occasion. Residuals of the four indicators were allowed to covary across occasions. Occasion-specific factors were used to specify one factor assessing initial differences at T1 (INT = intercept of the growth trajectory) and one factor assessing the individual amount of linear change (SLO = slope of the growth trajectory). To accommodate nonlinear change, one factor loading (λ) for the slope factor was set to be free; it can be interpreted as the proportion of change between T1 and T2 relative to the total change occurring from T1 to T3. COR(I, S) = correlation between initial level and change.

parceling has two main advantages. First, parcels are usually more reliable and more likely to be normally distributed than single items. Second, parceling reduces the number of estimated model parameters and thus reduces the complexity of the specified model. This also decreases the chances of cross-loadings emerging, because fewer indicators are used and unique variances are smaller (Little et al., 2002; see McCrae, Zonderman, Costa, Bond, & Paunonen, 1996, for the role of cross-loadings in the Big Five factor structure).

In studies of change, it is important to ensure that the changes observed in manifest indicators are due to real changes in the phenomena being studied and not to a changing relation between the latent variables and their indicators (Bollen & Curran, 2006; Meredith & Horn, 2001). A major advantage of incorporating multiple indicators for each personality variable is that the invariance of the measurement model across time can be assessed. Detailed analyses (presented in the Appendix) showed that strict factorial invariance holds across time with respect to the Big Five personality factors in the present study. Thus, in all models presented in the Results section, the measurement part was constrained to be measurement invariant across time points (i.e., invariant factor loadings, measurement intercepts, and error variances). Furthermore, we allowed for correlated residuals across time to account for the effects of specific factors not accounted for by the underlying common factors (Marsh & Hau; 1996; see also Jöreskog, 1979). Bollen and Curran (2006, p. 250) argued that if the dependence among the residuals of the indicators is ignored, the latent curve model is likely to provide a distorted view of the relations that hold for the substantive variables.

The occasion-specific factors were used to define two latent factors that describe individuals' growth in a Big Five personality factor across time, controlling for measurement error that is due to deviation from the true trajectory and measurement error that is due to disturbances at the indicator level: the latent intercept factor representing initial individual differences at the first occasion of measurement at the end of high school (initial level; INT in Figure 1) and the latent slope factor representing the amount of individual change (slope; SLO in Figure 1). The latent intercept factor was identified by fixing all loadings to unity. Consequently, the mean of the intercept factor reflects the mean trait level of the respective personality dimension at T1, and its variance indicates the amount of individual differences at T1. To identify the change factor, we fixed its loading at T1 to 0 and its loading at T3 to 1. Thus, the mean of this factor represents the mean change between T1 and T3, and its variance indicates individual differences in change. However, we did not fix the loading at T2 to any prespecified value but allowed it to be directly estimated from the empirical data (Meredith & Tisak, 1990). An advantage of this freely estimated loading at T2 is that it provides additional flexibility in fitting nonlinear forms of growth. We adopted this empirical approach to represent the shape of growth curve because previous
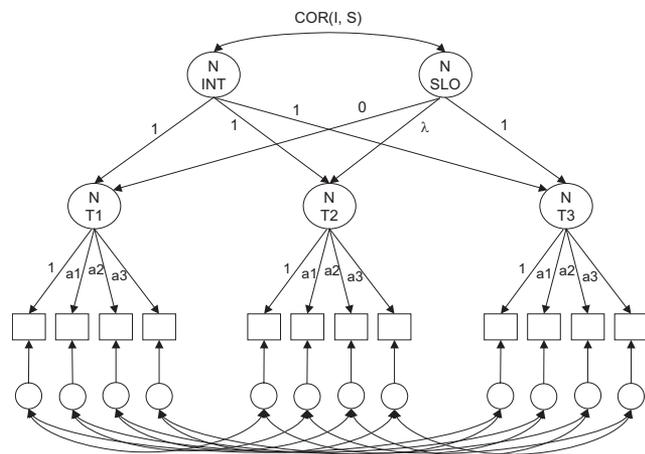
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[3] The numbers of positive life events ($r = .24$, $p < .001$) were correlated across the two periods, as were the numbers of negative life events ($r = .37$, $p < .001$), indicating a certain degree of stability in the type of events experienced by the participants. There was only a weak association between the numbers of positive and negative events at each occasion of measurement (T2: $r = .12$, $p < .001$; T3: $r = .14$, $p < .001$).

research indicated that change in the Big Five personality factors would follow nonlinear patterns (see Neyer & Lehnart, 2007). The freed loading can be interpreted as the proportion of change in the respective personality dimension between T1 and T2 relative to the total change occurring from T1 to T3. Hence, a factor loading of .6 would indicate that 60% of the total observed change occurred between T1 and T2 and 40% between T2 and T3. A separate loading at T2 was estimated for each Big Five slope factor.

To simultaneously assess the growth processes in the Big Five personality factors, we estimated multidimensional latent curve models. A multivariate latent curve model is a straightforward extension of the unidimensional latent curve model depicted in Figure 1. The main advantage of the multidimensional latent curve model is that it enables researchers to investigate associations in individual differences in initial level and change among the Big Five personality factors (e.g., whether changes in Neuroticism are negatively associated with changes in other personality domains; see Allemand et al., 2007).

Model fit was judged on conventional criteria: the chi-square test, the comparative fit index (CFI), and the root-mean-square error of approximation (RMSEA). The practical fit indices were employed because the chi-square statistic is known to be problematic in the context of very large data sets such as that employed here (e.g., Hoyle, 1995). Several guidelines for cutoff values have been suggested. CFI values greater than .90 are typically taken to reflect an acceptable fit to the data (Marsh, Hau, & Grayson, 2005). RMSEA values lower than .05 and .08 reflect a close fit and a reasonable fit, respectively; values between .08 and .10 reflect a mediocre fit, and values greater than .10 are generally unacceptable (Browne & Cudeck, 1993).

Results

We begin this section by presenting findings on continuity and change in personality traits across time. In the next step, we estimate individual growth trajectories of personality change using latent curve models and relate these trajectories to participants' vocational life paths. Finally, we examine whether initial level and change in personality development were associated with the occurrence of positive and negative life experiences across the 4-year period.

Continuity and Change of Personality Traits

Mean-level change and rank-order stability.   The latent means of each personality dimension at each time point as well as the standard deviations are reported in Table 1. Based on these latent means and standard deviations, standardized mean differences were calculated. Agreeableness and Conscientiousness showed the largest amount of mean-level change over the study period, both increasing by about 1/2 of a standard deviation. In contrast, Extraversion did not show meaningful change ($d = 0.08$) across the 4-year period. The mean-level analyses also showed that, on the whole, all personality traits exhibited less change across the second assessment period (see Lüdtke et al., 2009, for a previous presentation of T1 and T2 results).

Table 1 also shows the latent factor test–retest correlations for the Big Five dimensions. All correlations were above .70, with the exception of Neuroticism across the entire 4-year period (.66). On average, Openness showed the highest correlations across the two assessment periods ($r = .86$), and Neuroticism showed the lowest correlations ($r = .72$). In addition, the pattern of correlations revealed slightly increasing levels of stability for the Big Five personality traits. To investigate this observation more systematically, we tested for each personality trait whether the T_{12} stability correlation was statistically different from the T_{23} correlation. Four of the five T_{23} correlations were statistically significantly higher than the corresponding T_{12} correlation ($p < .05$). These results are consistent with previous research (Vaidya et al., 2008; see also Roberts & DelVecchio, 2000), which highlights the increasing stability of personality across the life span.

Latent curve model.   We estimated a multivariate latent curve model with multiple indicators (see Figure 1) to assess interindividual differences in intraindividual change in the Big Five personality factors. The model showed a good fit to the data, $\chi^2(1695) = 7,750.9$, CFI = .927, RMSEA = .028. The slope loadings at T2 confirmed the observation that change in all personality dimensions followed a nonlinear pattern (all loading parameters greater than .50). For example, change in Openness was stronger between T1 and T2 than between T2 and T3. More specifically, the factor loading of .86 indicates that 86% of the total observed change occurred between T1 and T2 and only 14% between T2 and T3 (see Table 2).

Table 1
Latent Mean Differences and Latent Correlations for Personality Traits

| Personality trait | M | | | | Mean-level change (d) | | Stability | | |
	Time 1	Time 2	Time 3	SD	T_{12}	T_{23}	T_{12}	T_{23}	T_{13}
Neuroticism	2.28	2.16	2.15	0.43	−.27	−.03	.72$_a$ (.65)	.78$_b$ (.72)	.66 (.60)
Extraversion	2.85	2.88	2.88	0.36	.08	.01	.79$_a$ (.70)	.83$_b$ (.74)	.74 (.64)
Openness	2.76	2.83	2.84	0.37	.20	.02	.86$_a$ (.74)	.89$_b$ (.78)	.84 (.70)
Agreeableness	2.91	3.01	3.06	0.31	.32	.16	.78$_a$ (.65)	.81$_b$ (.69)	.73 (.62)
Conscientiousness	2.89	3.02	3.10	0.40	.32	.18	.77$_a$ (.68)	.80$_b$ (.72)	.72 (.63)

Note. d = (mean of Time 2 − mean of Time 1)/pooled standard deviation. All correlations are statistically significant at $p < .01$. Stability correlations between observed scale scores are reported in parentheses. T_{12} and T_{23} stability coefficients with different subscripts indicate statistically significant differences between the two stability coefficients at $p < .05$.

Table 2
Multivariate Latent Curve Model for Personality Traits

Personality trait	Slope loading at Time 2	Intercept		Slope	
		M	Variance	*M*	Variance
Neuroticism	.79	2.28	0.12	−.14	.04
Extraversion	.77	2.85	0.11	.03	.02
Openness	.86	2.76	0.13	.09	.02
Agreeableness	.66	2.91	0.08	.15	.02
Conscientiousness	.65	2.89	0.14	.20	.03

Note. Intercept and slope parameters from the multivariate latent curve model (all values are statistically significantly different from 0, $p < .001$). Slope loadings from the latent personality measure at Time 2 to the latent personality slope factor; slope loadings at Time 1 = 0, slope loadings at Time 3 = 1 (see Figure 1).

The latent intercepts represent the initial level of a personality trait at T1 and are the same as the latent means in Table 1. The variance of the latent intercepts indicates the amount of reliable individual differences at T1. The mean of the slope factors indicates the rate of change across the 4-year period. The findings are consistent with the previously reported mean-level findings. Whereas Neuroticism declined across time (−.14), Conscientiousness, Agreeableness, and, to a lesser extent, Openness were found to increase across the 4-year period. Most interesting is that the statistically significant variance components revealed that all five personality factors showed reliable individual differences in change across time. To gain insight into the magnitude of variation, we followed the recommendations of Raudenbush and Bryk (2002, p. 78) and calculated the 95% plausible value range of the slopes using information on the average slope and the slope standard deviation. For example, if one assumes normally distributed random effects, the slope parameters for Neuroticism ranged between −.54 (−.14 − 2 × .20) and .26 (−.14 + 2 × .20) for approximately 95% of the participants in the present study. Thus, although on average Neuroticism decreased across the 4-year period, a substantial number of participants increased in Neuroticism across time. Similarly, Conscientiousness (−.14, .54), Extraversion (−.25, .31), Openness (−.21, .37), and Agreeableness (−.13, .43) demonstrated significant variation across time. This simple illustration indicates that although the sample as a whole increased on Extraversion, Openness, Agreeableness, and Conscientiousness and decreased on Neuroticism, there were substantial individual differences in the intraindividual rate of change across the 4-year period. This finding replicates previous research, confirming the existence of reliable individual differences in the rate of personality trait change (Roberts & Mroczek, 2008).

In the next step, we examined associations between individual differences in latent intercepts and individual differences in latent slopes among the Big Five personality factors. Table 3 reports three types of correlations. First, correlations among the latent intercepts are presented in the upper left part of the correlation matrix. These correlations reflect associations between the initial levels of the personality traits at T1. The correlations ranged between −.44 for Neuroticism and Extraversion and .35 for Extraversion and Agreeableness. Second, correlations between latent intercepts and latent slopes for the personality traits are shown in the lower left part of the matrix.

Positive correlations indicate that participants with high scores in a personality trait at T1 increased more in that trait than participants with low scores at T1. Several statistically significant correlations were found. The most pronounced associations were the positive relation between the initial level and the individual rate of change in Neuroticism ($r = .26$) and the negative relations between the initial levels and individual rates of change in Conscientiousness ($r = −.34$) and Openness ($r = −.25$). Third, correlations between the latent slope factors are shown in the lower right part of the correlation matrix. Change in Neuroticism was negatively associated with change in Extraversion, Agreeableness, and Conscientiousness, indicating that, on average, participants with above-average individual slope values in Neuroticism tended to show below-average slope values in Extraversion, Agreeableness, and Conscientiousness. In addition, change in Agreeableness was positively linked to change in Extraversion and Conscientiousness. These findings are consistent with a previous study that examined correlated change in the Big Five personality using two-wave data (Allemand et al., 2007; see also Allemand, Zimprich, & Martin, 2008). Overall, these correlations among intraindividual rates of change suggest that there is a certain degree of commonality in personality change across time.[4]

Life Paths and Personality Traits: Selection and Socialization

In the next step, we examined how the different life paths pursued by the participants were related to initial level and individual rate of change in the Big Five personality traits. One of the

[4] To explore potential gender differences in personality development, we included gender (1 = female, 0 = male) in the multivariate latent curve model and assessed its correlation with individual variation in latent intercepts and latent slopes. Gender was statistically significantly positively related to initial differences in Neuroticism ($r = .27$, $p < .001$), Extraversion ($r = .13$, $p < .001$), Openness ($r = .20$, $p < .001$), Agreeableness ($r = .24$, $p < .001$), and Conscientiousness ($r = .10$, $p < .001$). In addition, statistically significant gender differences in individual rates of personality change were found for two of the Big Five dimensions, namely Neuroticism ($r = .19$, $p < .001$) and Agreeableness ($r = .12$, $p < .05$), indicating that, on average, women showed less decrease in Neuroticism and more increase in Agreeableness than men over the 4-year period.

Table 3

Intercorrelations Among Interindividual Differences in Intercept and Slope Parameters for the Big Five Personality Traits

Personality trait	1	2	3	4	5	6	7	8	9	10
					Intercept					
1. Neuroticism	—									
2. Extraversion	**−.44**	—								
3. Openness	**.12**	**.06**	—							
4. Agreeableness	**−.12**	**.35**	**.08**	—						
5. Conscientiousness	**−.30**	**.21**	**−.14**	**.19**	—					
					Slope					
6. Neuroticism	**.26**	**−.17**	.03	**−.21**	**−.14**	—				
7. Extraversion	−.08	**−.12**	.03	**.14**	−.11	**−.45**	—			
8. Openness	**−.19**	.10	**−.25**	**.15**	−.01	.06	.07	—		
9. Agreeableness	.09	**−.20**	**.14**	−.11	**−.20**	**−.34**	**.43**	.14	—	
10. Conscientiousness	**.15**	.03	.01	.08	**−.34**	**−.38**	.12	−.01	**.23**	—

Note. Values in bold are statistically significant at $p < .05$.

most important changes occurring for our sample during the period of assessment was the transition from secondary education to university or some form of vocational training or work. In Germany, the normative vocational life path pursued by young adults after attending the higher track of secondary education (Gymnasium) is to go to college. Consistent with this expectation, 1,179 (66.4%) of the TOSCA participants entered college during the 4-year period, whereas 597 (33.6%) entered some form of vocational training or started work. More specifically, 325 (18.2%) entered a *Berufsakademie*,[5] 245 (13.8%) started vocational training, and 27 (1.5%) entered the workforce without any further training.

Two main life paths were distinguished for the present study, and the participants were grouped accordingly. The first group contained all individuals who attended university during the 4-year period. The second group comprised all individuals who started some form of vocational training or work. A dummy variable (college = 0, noncollege = 1) was included in the multivariate latent curve model, allowing correlations with the intercept and slope factor to be calculated for each personality trait. The model showed a good fit to the data, $\chi^2(1745) = 7,892.3$, CFI = .926, RMSEA = .028. The initial level of Neuroticism when participants were still at high school negatively predicted college entry ($r = -.07$, $p < .05$), whereas the initial level of Openness was positively associated with college entry ($r = .12$, $p < .01$). Initial levels of Extraversion, Agreeableness, and Conscientiousness were unrelated to college entry. For individual differences in the intraindividual growth rate, two statistically significant relations emerged. Entering some form of vocational training was negatively linked to the growth rate in Agreeableness ($r = -19$, $p < .01$), indicating that on average participants who took the vocational track did not increase as fast on Agreeableness. In contrast, following the vocational track was positively linked to the growth rate in Conscientiousness ($r = .17$, $p < .01$). The mean-level trajectories of the Big Five personality traits for the two vocational life paths are depicted in Figure 2. To facilitate interpretation, we transformed values on the personality dimension to z scores ($M = 0$, $SD = 1$) using the mean and the standard deviation at T1. As can be seen, participants who went to college showed a lower Neuroticism level than participants who did not go to college, but these

levels decreased at the same rate across the 4-year period. In contrast, participants who went to college revealed a higher level of Openness across the whole period. As indicated by the two significant relations between individual growth rate and college attendance, there were two interaction effects: for change in Agreeableness and change in Conscientiousness. Whereas college students showed more increase in Agreeableness across the 4-year period, their overall level of Conscientiousness increased more slowly than that of participants who moved into some form of vocational training or work. No differences in either the initial level or the growth rate were found for Extraversion.

Life Events and Personality Development: Selection and Socialization

Before turning to the analyses of the relations between life experiences and change in personality traits, we briefly report some descriptive statistics for the life events assessed in our survey. As mentioned above, life events were rated at T2 for the period between the first and second assessments and at T3 for the period between the second and third assessments. Table 4 shows the frequency with which participants experienced the different life events at some time during the study. It is not surprising that some events were much more common than others. For instance, 2,075 participants reported that they had made a trip abroad since the last assessment. However, only 46 participants reported getting married, and only 14 participants reported being detained in a prison or comparable institution. As Table 4 also indicates, there was a large variation in whether the life events were rated as having more of a positive impact (e.g., getting married, winning an academic award or prize) or more of a negative impact (e.g., death of a friend, illness or injury of a family member).

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[5] In the *Berufsakademie* model, employers and state-run teaching institutions cooperate to provide practice-oriented education. Students receive on-the-job training in a company for about 6 months of the year and attend a practice-oriented higher educational institution for the other 6 months. *Berufsakademie* students are selected by the companies, and the majority of students stay with their employer after graduation.
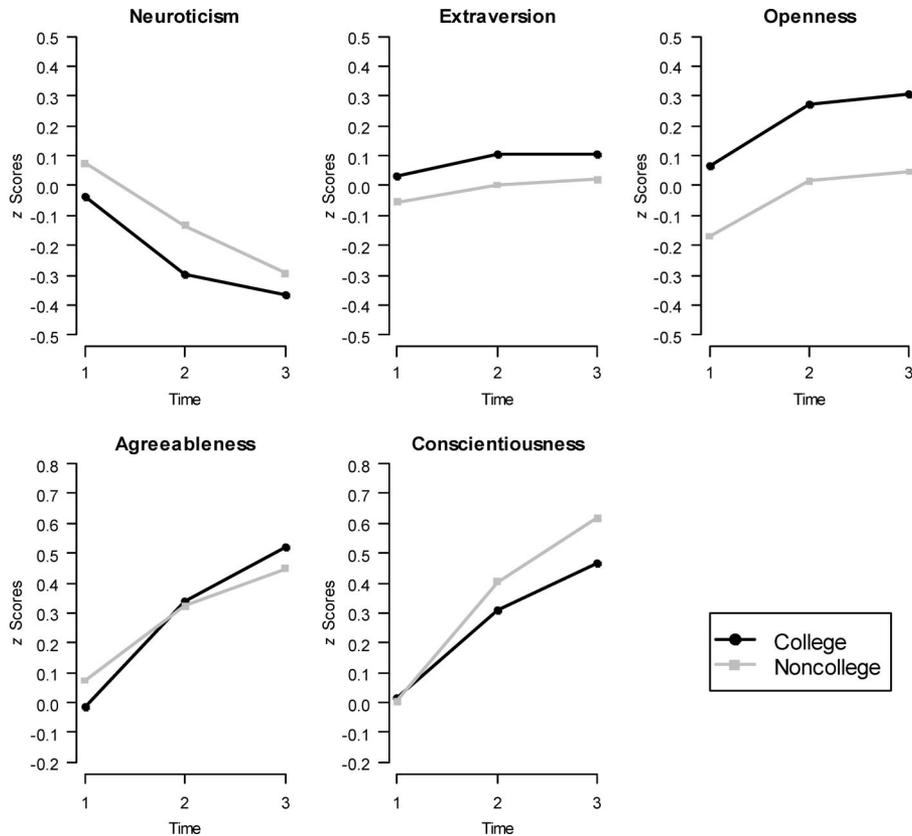
Figure 2. Latent curve trajectories for the Big Five personality traits for participants who entered college after high school (college) and participants who entered work or vocational training (noncollege).

Aggregated life events. In the next step, aggregated positive and negative life events were included in the multivariate latent curve model. These indices reflected the aggregation of positive and negative items across the life event ratings and combined the second and third assessments. The model showed a good fit to the data, $\chi^2(1796) = 8,137.3$, CFI = .924, RMSEA = .028. As Table 5 indicates, consistent with previous research (Magnus et al., 1993; Vaidya et al., 2002), the initial level of Neuroticism predicted the subsequent occurrence of negative life events ($r = .24$) but not positive events, and the initial level of Extraversion was positively linked to the subsequent occurrence of positive life events ($r = .12$) but not negative events. It is particularly interesting that initial Openness was positively associated with future positive ($r = .12$) and negative life events ($r = .08$), indicating that participants with a high level of Openness had both more positive and more negative life experiences across the 4-year period. In addition, higher initial levels of Conscientiousness predicted the occurrence of fewer negative events ($r = -.09$).

Furthermore, the results showed several statistically significant relationships between individual differences in personality change and the occurrence of positive and negative life events. In line with our expectations, change in Neuroticism was positively linked with the occurrence of negative events ($r = .30$), whereas change in Extraversion was positively correlated with the occurrence of positive events ($r = .14$). However, it was also the case that change

in Neuroticism was negatively correlated with experiencing positive events ($r = -.24$) and change in Extraversion was positively correlated with experiencing negative events ($r = -.10$). In addition, change in Agreeableness ($r = .16$) and Conscientiousness ($r = .16$) were both positively associated with experiencing positive life events across the whole period.[6]

Single life events. To better understand the relation between change in personality and the individual life events themselves, we also examined how single life events were associated with initial level and change in personality. To this end, factor scores were estimated for the intercept and slope factor of each personality trait and related to the occurrence of each single life event.[7] To avoid false positive findings due to Type I error, we fixed the p level for evaluating the statistical significance of the correlations at .001.

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[6] To control for the impact of the three open answers, where participants could mention any event that had affected their life since last testing, we repeated the analyses without these additional life events. The results were identical.

[7] Three life events (e.g., "death of a friend") were almost never (i.e., fewer than 10 times) rated as having a positive impact; likewise, four events (e.g., "got promoted at work") were almost never rated as having a negative impact. These life events were not correlated with the factor scores.

Table 4
Descriptive Statistics of Life Events Experienced

Life event	Frequency	*M*
Went abroad	2,075	4.59
Changed accommodation	1,588	4.06
Started a new job	1,572	4.16
Moved out of home	1,549	4.05
Change in financial situation (much better or worse)	1,457	3.31
Illness or injury of a family member	1,454	1.70
Entered a new relationship (lasting at least 1 month)	1,428	4.38
Broke off a relationship with a boyfriend/girlfriend	1,342	2.35
Convicted for a minor offence (fare dodging, speeding, etc.)	1,314	2.71
Change in sleeping habits (much more or less sleep)	1,094	2.54
Own injury or illness	1,031	1.97
Change in eating habits (much more or less food intake)	1,029	3.10
Illness or injury of a friend	905	1.91
Death of a family member	885	1.58
Failed an important exam	761	1.91
Increased working hours	717	2.78
Began regular work after graduation	643	4.18
Won an academic award or prize	596	4.40
Changed major/stopped university studies/apprenticeship	509	3.94
Changed to another university/apprenticeship	450	4.16
Sexual problems	437	1.76
Quit smoking	339	4.29
Death of a friend	248	1.38
Quit a job	243	3.27
Borrowed a large amount of money (more than €1,000)	190	2.73
Got promoted at work	184	4.46
Started psychotherapy	171	3.81
Joined a student association	164	3.80
Parents broke up or divorced	117	2.03
Got married	46	4.57
Failed the high school diploma	36	2.14
Got pregnant (self or partner)	33	3.34
Had an abortion (self or partner)	29	2.51
Was detained in a prison or comparable institution	14	2.87

Note. Ratings were made on a 5-point scale where 1 = *high negative impact* and 5 = *very positive impact*. Values are based on aggregated scores (across Time 2 and Time 3). Life events are sorted by frequency of occurrence across the whole time period (i.e., number of persons who experienced the event at some time during the study).

The results showed several statistically significant associations between the initial level and change in the Big Five personality traits and the occurrence of positive and negative life events (see Tables 6–10). As could be expected from the analyses of the aggregated life events, the initial level of Neuroticism was positively linked to the occurrence of several negative life events (see Table 6). Specifically, people higher in Neuroticism were more likely to have more problems in their sex life ($r = .17$) and to have negative experiences when changing habits such as eating ($r = .16$) or sleeping ($r = .16$), or changing their academic ($r = .11$) or employment situations ($r = .12$). Of particular interest is that people who were more neurotic were more likely to find two experiences more positive: starting psychotherapy ($r = .29$) and change in their university studies ($r = .08$).

In terms of socialization associations, many of the events resulting from higher Neuroticism were associated with increases in Neuroticism. For example, negative experiences with changes in one's sleeping ($r = .17$) and eating habits ($r = .15$), negative sexual experiences ($r = .15$), and negative transition experiences at college ($r = .12$) or work ($r = .13$) were all associated with increases in Neuroticism. It is particularly interesting that starting

psychotherapy was associated with increases in Neuroticism regardless of whether it was experienced negatively ($r = .08$) or positively ($r = .17$). That is, people who entered psychotherapy became more neurotic whether they experienced it as a negative or a positive event.

As Table 7 indicates, the initial level of Extraversion at T1 predicted the occurrence of both negative and positive events. People who were more extraverted were less likely to experience a new job ($r = -.13$), moving ($r = -.08$), or beginning regular work ($r = -.07$) negatively. By the same token, they were more likely to find getting promoted ($r = .12$), starting a new job ($r = .12$), taking trips abroad ($r = .13$), and embarking on new relationships ($r = .10$) to be positive experiences. Thus, in general, extraverted people had fewer negative experiences and more positive experiences. These findings are consistent with the results of the analyses based on aggregated events. In terms of socialization associations, we found mostly negative associations. That is, negative experiences were associated with decreases in Extraversion. Specifically, negative changes in finances ($r = -.09$), eating habits ($r = -.09$), and university studies ($r = -.07$) were associated with decreases in Extraversion, as were sexual problems

Table 5

Correlations Between Positive and Negative Life Events and Personality Trait Change

Personality trait	Life event	
	Positive	Negative
Neuroticism		
Intercept	−.03	**.24**
Slope	**−.24**	**.30**
Extraversion		
Intercept	**.12**	−.03
Slope	**.14**	**−.10**
Openness		
Intercept	**.12**	**.08**
Slope	**.11**	.06
Agreeableness		
Intercept	.03	−.04
Slope	**.16**	−.07
Conscientiousness		
Intercept	.04	**−.09**
Slope	**.16**	−.06

Note. Values in bold are statistically significant at $p < .05$.

($r = −.08$). The only substantive correlation between changes in Extraversion and positive events emerged for taking a trip abroad ($r = .11$). Students who enjoyed a trip outside their own country tended to increase in Extraversion over time.

Consistent with the aggregated results, Openness predicted the occurrence of positive and negative events, but change in Openness was almost unrelated to the life events experienced during the 4-year period (see Table 8). Openness predicted negative experiences with sexual problems ($r = .08$) and with changes in one's

Table 6

Correlation Between Single Positive and Negative Life Events and Initial Status and Change in Neuroticism

Selection[a]	r	Socialization[b]	r
Negative events			
Sexual problems	.17	Change in sleeping habits	.17
Change in eating habits	.16	Sexual problems	.15
Change in sleeping habits	.16	Change in eating habits	.15
Started a new job	.12	Started a new job	.13
Psychotherapy	.11	Change in university studies	.12
Change in university studies	.11	Changed accommodation	.12
Moved out of home	.09	Increased working hours	.09
Illness of family member	.08	Failed important exam	.09
Change in financial situation	.07	Change in financial situation	.09
Quit a job	.07	Psychotherapy	.08
		Own illness	.08
Positive events			
Psychotherapy	.29	Psychotherapy	.17
Change in university studies	.08	Went abroad	−.11
Went abroad	−.08	Got promoted at work	−.08
		Began regular work	−.07

Note. Only correlations that are statistically significant at $p < .001$ are reported.
[a] Correlation between initial status of Neuroticism and occurrence of single life event. [b] Correlation between change in Neuroticism and occurrence of single life event.

Table 7

Correlation Between Single Positive and Negative Life Events and Initial Status and Change in Extraversion

Selection[a]	r	Socialization[b]	r
Negative events			
Started a new job	−.13	Change in financial situation	−.09
Changed accommodation	−.08	Change in eating habits	−.09
Began regular work	−.07	Sexual problems	−.08
Change in university studies	−.07	Change in sleeping habits	−.08
		Change in university studies	−.07
Positive events			
Got promoted at work	.12	Went abroad	.11
Started a new job	.12		
Went abroad	.13		
Entered a new relationship	.10		
Changed accommodation	.09		
Change in financial situation	.08		
Psychotherapy	−.07		

Note. Only correlations that are statistically significant at $p < .001$ are reported.
[a] Correlation between initial status of Extraversion and occurrence of single life event. [b] Correlation between change in Extraversion and occurrence of single life event.

eating habits ($r = .09$), sleeping habits ($r = .09$), financial situation ($r = .08$), and university studies ($r = .07$). At the same time, open people were more likely to have positive experiences of changing their accommodation ($r = .22$), moving out of home ($r = .16$), traveling abroad ($r = .08$), or starting psychotherapy ($r = .12$). Consistent with the findings from the life path analyses, open people were less likely to have positive experiences when beginning regular work ($r = −.10$). Relative to both Neuroticism and Extraversion, far fewer experiences were correlated with change in

Table 8

Correlation Between Single Positive and Negative Life Events and Initial Status and Change in Openness to Experience

Selection[a]	r	Socialization[b]	r
Negative events			
Change in eating habits	.09	Psychotherapy	−.07
Broke off a relationship	.09	Change in university studies	−.07
Change in sleeping habits	.09		
Change in financial situation	.08		
Sexual problems	.08		
Changed major	.07		
Own injury	.07		
Positive events			
Change in accommodation	.22		
Moved out of home	.16		
Psychotherapy	.12		
Change in university studies	.11		
Began regular work	−.10		
Went abroad	.08		
Change in eating habits	.07		

Note. Only correlations that are statistically significant at $p < .001$ are reported.
[a] Correlation between initial status of Openness and occurrence of single life event. [b] Correlation between change in Openness and occurrence of single life event.

Openness. Negative experiences of psychotherapy ($r = -.07$) and change in university studies ($r = -.07$) were both associated with a decrease in Openness.

There were far fewer statistically significant findings for Agreeableness than for any other trait domain (see Table 9). More agreeable students were more likely to experience trips abroad positively ($r = .08$). In turn, positive experiences with changing one's accommodation ($r = .10$), traveling abroad ($r = .10$), and changing university studies ($r = .08$) were associated with increases in Agreeableness.

Finally, the selection effects for Conscientiousness were similar to those found for Extraversion in that conscientious participants had fewer negative experiences and more positive experiences (see Table 10). Specifically, they were less likely to experience changes in their financial situation ($r = -.11$), starting a new job ($r = -.09$), or failing an exam ($r = -.08$) negatively. At the same time, they were more likely to experience winning academic awards ($r = .12$), beginning regular work ($r = .11$), and getting promoted ($r = .07$) positively. There was only one socialization association for Conscientiousness: People who had a positive experience of starting a new job tended to increase more in Conscientiousness over time.

Discussion

The general patterns of personality development found in this sample were, as in many previous samples, consistent with the maturity and cumulative continuity principles (Roberts & Wood, 2006). These young adults from Germany became more agreeable, conscientious, and emotionally stable as they transitioned from high school to college, and their personalities became increasingly consistent with age. Where this study went beyond most previous research was in systematically investigating how these changes relate to both life paths and life events.

Life Paths, Life Events, and Personality Trait Development

Life paths showed distinct relations to personality trait development. Individuals who took a more vocationally oriented path increased in conscientiousness at a faster rate than their peers who solely focused on their studies. In contrast, they showed less of an increase in agreeableness than those attending university, although it should be noted that both groups increased on agreeableness throughout the period of study. That being said, the variation in the

Table 9
Correlation Between Single Positive Life Events and Initial Status and Change in Agreeableness

Selection[a]	r	Socialization[b]	r
Went abroad	.08	Changed accommodation	.10
		Went abroad	.10
		Change in university studies	.08

Note. Only correlations that are statistically significant at $p < .001$ are reported.
[a] Correlation between initial status of Agreeableness and occurrence of single life event. [b] Correlation between change in Agreeableness and occurrence of single life event.

Table 10
Correlation Between Single Positive and Negative Life Events and Initial Status and Change in Conscientiousness

Selection[a]	r	Socialization[b]	r
		Negative events	
Change in financial situation	−.11		
Started a new job	−.09		
Failed an exam	−.08		
		Positive events	
Won an academic award	.12	Started a new job	.07
Began regular work	.11		
Change in financial situation	.08		
Got promoted at work	.07		
Change in university studies	−.08		
Quit smoking	−.09		

Note. Only correlations that are statistically significant at $p < .001$ are reported.
[a] Correlation between initial status of Conscientiousness and occurrence of single life event. [b] Correlation between change in Conscientiousness and occurrence of single life event.

general pattern of increase could be interpreted in at least two ways. First, it may partially reflect the type of person who pursues vocational training earlier in life and the provisional identity people have created around their life path (Roberts et al., 2004). For example, people who pursue more vocational or work-related goals tend to see themselves as less agreeable (Roberts & Robins, 2000). Thus, the provisional identity of the student following the vocational path would be one in which he or she envisions taking the more demanding road in which personal relations may have to be sacrificed in the service of hard work. In contrast, the identity structure of the more typical university-focused student may be less serious (attending classes is optional) and mutually rewarding (agreeable).

Second, the changes that occur as a result of following these different paths may reflect the idiosyncratic nature of the types of experiences found for this life path in this sample. People embarking on more work-oriented activities may follow a more disciplined schedule and may be called upon to show potential employers that they are viable future employees by being hardworking and industrious. Conversely, the more serious, possibly competitive nature of these activities may lead to an attenuation of agreeableness at this time in life. Or the contrast between the experiences of the vocational path and the more prototypical identity of late adolescence may make students feel less generous toward others (King & Smith, 2004). In contrast, students on the university path may simply have had fewer demands to become conscientious at this time, at least compared with those heading to work. This is not to say that all work-related experiences were associated with becoming less fun and more serious. Some of the specific life events related to achievement and work were associated with more positive changes. For example, positive experiences of beginning regular work and starting a new job were associated with increases in emotional stability.

What was most compelling about our study of life events and their relation to personality development was how they provided insights going beyond any current theoretical ideas on why personality traits change in young adulthood. The comprehensive and

evaluative nature of the life events examined revealed that changes can be both idiosyncratic and intrinsically tied to specific life experiences and their meaning. First, the general positivity and negativity of the life events were systematically related to both level and change in personality. Or to put it other terms, we found both selection and socialization associations for the relation between personality traits and life events. Consistent with past research, extraversion and neuroticism predicted experiencing more positive and negative life events, respectively (Magnus et al., 1993; Vaidya et al., 2002). In turn, positive life events were associated with increases in extraversion, and negative life events with increases in neuroticism. This reciprocal pattern between personality and life events is consistent with the correspondence principle (Roberts et al., 2008). This principle describes the general trend for the personality traits that shape the contours of life to be the same traits that change in relation to the life experiences occurring on those life paths. Thus, life experiences are not random and do, in part, result from personality traits. Conversely, those life experiences are associated with changes consistent with the personality traits that bring about the life experiences in the first place.

Unlike in previous research, we also found interesting patterns of associations between overall positive and negative life events and the other Big Five factors. Openness to experience predicted experiencing both more positive events and more negative events. It seems that being more open evoked more events across the board. In turn, positive events were associated with increases in openness. In contrast, agreeableness failed to predict having more positive or negative life events, but having more positive events was related to increases in agreeableness—a clear example of a noncorrespondent relation. Finally, higher levels of conscientiousness in high school predicted experiencing fewer negative life events in college but were unrelated to experiencing more positive life events. In turn, and as in the case of agreeableness, experiencing more positive life events was associated with increases in conscientiousness over time.

We also examined selection and socialization patterns between personality traits and individual life experiences. Given the relatively unreliable nature of the single life events, we view these findings as preliminary. Nonetheless, several fascinating patterns emerged. As one would expect given the evaluative way in which the events were rated, we found the largest number of correlations with neuroticism. Neuroticism predicted experiencing a wide range of negative life events, such as having more difficulties with new jobs, finances, change in university studies, and when moving. Neuroticism in high school also predicted having more difficulties sleeping, eating, and in one's sex life while in college. Not too surprising, those higher in neuroticism were less likely to experience traveling abroad positively. Most surprising, people who were more neurotic were more likely to find starting psychotherapy to be both more negative and more positive, reflecting the fact that they were more likely to seek out psychotherapy in general. Many of the change associations were consistent with the predictive relationships, with negative experiences in work and school, as well as negative experiences sleeping, eating, and with sex, being associated with increases in neuroticism.

The most conspicuous feature of the selection and socialization patterns was the importance of sleeping patterns, eating patterns, and sexual problems. It is particularly interesting that sleeping and eating problems are features of depression, which may underlie changes in both neuroticism and life events. Negative experiences in one's sex life fail to register in any theory of personality development, though clearly should be given more attention in view of their robust relation to changes in neuroticism in this age group. A second interesting feature of the socialization associations was that the experience of psychotherapy, whether positive or negative, was associated with increases in neuroticism. This runs counter to the consistent finding that psychotherapy is associated with improvement in psychological functioning, including decreases in neuroticism (De Fruyt, Van Leeuwen, Bagby, Rolland, & Rouillon, 2006). However, most psychotherapy outcome research is conducted using highly controlled settings, select samples, and controlled interventions. It may be possible that outside randomized control clinical trials, psychotherapy is used like medicines—unsystematically and often without clear adherence (Christensen & Johnson, 2002). In this type of context, psychotherapy may not be effective and may, therefore, be symptomatic of the increasing neuroticism observed in people with more negative life events. Finally, not all life experiences were related to increases in neuroticism. Positive work experiences and positive experiences while traveling abroad were associated with decreases in neuroticism.

Extraversion had more selection than socialization relations. Higher extraversion predicted a decreased likelihood of problems at work, difficulties with one's studies, or difficulties with moving. In contrast, those who were more extraverted were more likely to have positive experiences at work (e.g., promotions), in relationships, and with trips abroad. It is particularly interesting that those who were more extraverted were less likely to have positive experiences in psychotherapy, which probably indicates that extraverted people were less likely to seek out psychotherapy. The socialization effects of life events were surprisingly consistent with those found for neuroticism. More negative life experiences with sleeping, eating, one's sex life, finances, and university studies were associated with decreases in extraversion. Also consistent with the socialization patterns for neuroticism, the sole positive life event associated with increases in extraversion was a positive experience of traveling abroad.

The pattern of individual life experience correlates was similar for openness, in that the majority of statistically significant correlations were indicative of a predictive relation between personality and the occurrence of life events. What was most interesting about the content of these predictive relations was, as noted above, that higher levels of openness were related to experiencing more positive and negative life events. Even more interesting was the content of those events. The findings for many of the positive events were not too surprising. People who were more open were more likely to have positive experiences moving and changing majors but less likely to have positive experiences at work because they were less likely to enter the vocational track than others. On the other hand, higher levels of openness predicted more positive experiences in psychotherapy and more negative experiences with activities such as sleeping, eating, sex, and finances. What is most interesting about these

last experiences is that they were all subsequently associated with increases in neuroticism. It seems that one of the unintended consequences of higher openness in the context of going to university is an increase in neuroticism. Only two life experiences were correlated with changes in openness: Negative experiences with psychotherapy and changing majors were both related to a decrease in openness to experience.

Agreeableness had the fewest correlates and only with positive life events. The most salient finding was that agreeable people tended to have more positive experiences when traveling abroad and that these same travel experiences were related to increases in agreeableness. Conscientiousness showed predominately selection effects that were overwhelmingly consistent with the trait domain. People who were more conscientious in high school had fewer negative experiences in school and work and, in turn, more positive experiences in school and work. As noted above, the only socialization effect was for positive work experiences, which were associated with increases in conscientiousness.

Several features of the individual life events analyses deserve note. First, most of the correlations were small, which is not surprising given the intrinsically unreliable nature of life event ratings and their sometimes skewed distributions. Second, we did not anticipate the importance of mundane life experiences for personality development. Changes, both positive and negative, in experiences of sleeping, eating, and sex were the most pervasive correlates of personality level and change. Though less psychologically complex, these correlates provide surprisingly interesting insights into how to improve the lives of university students. Accepting that little can be done about students' sex lives, we infer that working on the more mundane aspects of student life—their sleeping and eating habits and travel abroad programs—may have pervasive positive effects on patterns of personality development in this population.

Limitations and Future Directions

Some critical issues should be taken into consideration when interpreting the results of this study. First, our study has a limitation common to practically all real-world, nonexperimental research: the possibility of third-variable explanations (Morgan & Winship, 2007). Despite our longitudinal approach, it cannot be ruled out that unobserved variables were responsible for the associations observed between the occurrence of certain life events and change in personality traits over the 4-year period. Further evidence for a causal interpretation of the reported findings would be provided by identifying the mechanisms that, for example, lead persons high in certain personality characteristics to have specific life experiences. Second, an obvious limitation of our study was that both the personality ratings and the ratings of the positivity and negativity of life events experienced were entirely based on self-reports. A more desirable approach would be to obtain observer ratings (e.g., peer ratings) of personality in order to reduce the common method variance of personality ratings and the evaluation of life events. In addition, it cannot be ruled out that the assessment of continuity and change is distorted by possible effects of social desirability and response sets. Third, the analyses are based on data from three points of measurement, meaning that only

limited conclusions can be drawn on the shape of the developmental trajectory (e.g., quadratic trends) in different personality domains (see Mroczek et al., 2006). The latent curve models in the present study indicated that personality change followed a nonlinear pattern across the 4-year period. However, studies with more measurement points are needed to provide a more stringent test for curvilinear patterns of personality development during that age period. Fourth, generalizability is an issue. It is unclear to what extent cultural differences might affect the relations between life events and personality development. Although no previous studies have documented major differences between interindividual differences in personality change in Germany and, for instance, the United States, cross-cultural studies might detect such differences. Hence, we would like to see future studies that test relation between personality development and individual life experiences in diverse samples. Finally, the TOSCA sample consists of students making the transition from secondary education to university or some form of vocational training. University students, in particular, are still in the process of exploring career possibilities before making a concrete commitment to a specific career path. In future research, we will examine the extent to which the transition from college to the real world affects individual life experiences and continuity and change in personality development.

In conclusion, the present study significantly extends prior research on continuity and change in personality development by providing some potential explanations for why populations tend to increase on traits such as agreeableness, conscientiousness, and emotional stability in young adulthood. It is clear from our results that the life path one follows and the life events one experiences are the result of personality as well as potential causes of personality change. It is also clear from our results that the life paths and life events we studied cannot explain the entire pattern of change demonstrated by this sample during the transition from adolescence into young adulthood. Therefore, these findings provide a challenge to future research and theorizing to provide better explanations for the types of changes found in the transition to young adulthood.

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Appendix

Testing the Factorial Invariance of the Big Five Factor Structure Across Time

Factorial invariance of the Big Five personality factors across time was examined by means of confirmatory factor analyses, including means. To test for factorial invariance, one analyzes a series of nested models, starting with the least restrictive model (no invariance constraints imposed) and ending with the most restrictive model (total invariance), in which all parameters are constrained to be the same across time. If introducing increasingly stringent invariance constraints results in little or no change in goodness of fit, there is evidence in support of the invariance of the factor structure. Following Meredith (1993), we adopted the terms *strong* and *strict invariance*. Strong invariance holds when factor loadings and the intercepts of the manifest indicators are invariant across time, so that differences in average indicator scores across time reflect differences in latent means. Strict invariance holds when measured variable uniquenesses are also invariant across time, so that indicator and scale variances are comparable across time.

In the present study, we compared the comparative fit index (CFI) and the root-mean-square error of approximation (RMSEA) for models with a variety of different sets of invariance constraints, ranging from Model 1, with no invariance constraints for any parameter estimates, to Model 6, the most restrictive model in which all parameter estimates—factor loadings, intercepts of the manifest indicators, factor variances and covariances, and measured variable uniquenesses—were constrained to be the same across time. Model comparisons are summarized in Table A1. The fit of the initial (unconstrained) model was good (CFI = .941, RMSEA = .026), suggesting that the hypothesized factor structure represented a good fit to the data at each measurement occasion. According to the guidelines proposed by Cheung and Rensvold (2002) for interpreting changes in the CFI (ΔCFI) when testing factorial invariance, a certain degree of factorial invariance is

violated when the ΔCFI falls below −.01. However, no ΔCFI value for subsequent model comparisons fell below the critical cutoff value of −.01. Furthermore, the RMSEA values were all satisfactory and were not generally affected by the invariance constraints imposed. In Model 4 factor loadings, intercepts of the manifest indicators and unique variances of the indicators were constrained to be equal across time. Model 4 evidenced an acceptable fit, implying that strict factorial invariance holds across time with respect to the measurement model of the Big Five personality factors in the present study. In the next step, we also compared the latent variances and covariances of the Big Five factor across time by constraining factor variances (Model 5) and factor covariances to be equal across time. Invariant factor variances and covariances imply that the latent correlations among the Big Five factor can also be considered invariant across time (also called structural stability; see Robins et al., 2001). The resulting models still yielded an acceptable fit in terms of the CFI and RMSEA. This is in line with previous studies indicating a high degree of structural stability of Big Five personality dimensions across time (Allemand et al., 2007; De Fruyt et al., 2006; Robins et al., 2001). The intercorrelations among the Big Five dimensions ranged between −.50, for Neuroticism and Extraversion, and .30, for Agreeableness and Openness. Parameter estimates for the measurement part of Model 6 (factor loadings, manifest indicator intercepts, and explained variances) are shown in Table A2. Analyses reported in the Results section of the present study are based on the fully constrained Model 6. To facilitate interpretation of the latent means, we reparameterized Model 6 using a nonarbitrary method for the identification and scale setting of latent variables (see Little, Slegers, & Card, 2006). This method allows the estimation of latent means in a nonarbitrary metric that reflects the metric of the indicators measured.

Table A1

Fit Indices for Measurement Invariance Tests for the Big Five Personality Factors

Model	χ^2	df	CFI	RMSEA
1[a]	6,468.0	1,545	.941	.026
2[b]	6,646.3	1,575	.939	.026
3[c]	7,513.0	1,605	.929	.028
4[d]	7,670.4	1,645	.928	.028
5[e]	7,811.8	1,655	.926	.028
6[f]	7,867.3	1,675	.926	.028

Note. CFI = comparative fit index; RMSEA = root-mean-square error of approximation. [a] Unconstrained model. [b] Factor loadings invariant. [c] Factor loadings and intercepts invariant (strong invariance). [d] Factor loadings, intercepts, and uniquenesses invariant (strict invariance). [e] Factor variances constrained to be invariant across time. [f] Factor variances and covariances constrained to be equal across time.

Table A2

Parameter Estimates Model With Strict Factorial Invariance and Invariant Variances and Covariances Across Time

Parcel	Factor loading	Indicator intercept	R^2
Neuroticism			
1	1.000	0.118	.523
2	1.217	−0.402	.657
3	1.172	−0.225	.613
4	0.926	0.510	.452
Extraversion			
1	1.000	−0.613	.575
2	0.557	0.808	.271
3	0.844	−0.063	.448
4	0.934	−0.133	.650
Openness			
1	1.000	−0.875	.459
2	0.909	−0.298	.432
3	0.827	0.109	.530
4	0.505	1.064	.173
Agreeableness			
1	1.000	−0.128	.471
2	0.952	0.041	.411
3	0.898	0.214	.365
4	1.097	−0.127	.401
Conscientiousness			
1	1.000	−0.337	.634
2	1.006	−0.501	.563
3	0.922	0.058	.598
4	0.752	0.779	.431

Note. Factor loadings are unstandardized.